

Appendix C

HACCP FOODBORNE DISEASE DATA

Confirmed, Suspected & Unknown Etiology Foodborne Disease Outbreaks by Method of Preparation, Significant Ingredient, Agent and Contributing Factor (Cumulative: 01/01/80 through 12/31/95)

NOTE: For assistance in interpreting the data below, call the MDPH Food Protection Program at (617) 983-6712.

1) COOK/SERVE FOODS*

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	Gastrointestinal Virus (GI) <i>Salmonella</i>	(1)+ (26)	Inadequate Refrigeration (23)#
			Inadequate Hot-Holding (4)
			Food Prep Several Hours Before Serving (7)
			Inadequate Cooking (20)
			Inadequate Reheating (5)
			Contaminated Ingredients (22)
			Cross-Contamination (2)
			Hand Contact w/ Implicated Food (2)
			Consumption: Raw/Ltly Heated (Animal Origin) (3)
Beef	<i>Escherichia coli</i> O157:H7	(5)	Inadequate Refrigeration (3)
	<i>Campylobacter</i>	(2)	Inadequate Cooking (9)
	<i>Clostridium perfringens</i>	(2)	Contaminated Ingredients (3)
	<i>Salmonella</i>	(5)	Cross-Contamination (3)
	Other Chemical	(1)	Unknown (10)
	Unknown	(6)	
Pork	<i>Salmonella</i>	(2)	Inadequate Refrigeration (2)
	<i>Staphylococcus aureus</i>	(2)	Inadequate Hot-Holding (1)
	<i>Trichinella spiralis</i>	(4)	Inadequate Cooking (5)
	<i>Yersinia enterocolitica</i>	(2)	Unapproved Source (1)
			Contaminated Ingredients (3)
			Cross-Contamination (2)
			Unclean Equipment (1)
			Unknown (2)
Poultry	<i>Campylobacter</i>	(1)	Inadequate Refrigeration (5)
	<i>Clostridium perfringens</i>	(1)	Inadequate Hot-Holding (2)
	<i>Salmonella</i>	(6)	Food Prep Several Hrs Before Serving (1)
	<i>Staphylococcus aureus</i>	(2)	Inadequate Cooking (7)
	Unknown	(10)	Contaminated Ingredients (1)
			Infected Person (1)
			Cross-Contamination (4)
			Unclean Equipment (3)
			Improper Cooling (1)
			Hand Contact w/ Implicated Food (1)
			Unknown (9)
Fin Fish	Scombrotoxin	(1)	Natural Toxicant (1)
	Other Chemical	(1)	Unknown (3)
	Unknown	(2)	
Shellfish	Gastrointestinal Virus	(1)	Unknown (1)
Other Seafood	Gastrointestinal Virus	(1)	Inadequate Refrigeration (1)
	<i>Plesiomonas shigelloides</i>	(1)	Unknown (10)
	<i>Salmonella</i>	(2)	

	<i>Staphylococcus aureus</i>	(1)		
	Other Chemical	(1)		
	Unknown	(5)		
Starchy Foods	<i>Bacillus cereus</i>	(1)	Inadequate Refrigeration	(1)
	<i>Staphylococcus aureus</i>	(1)	Inadequate Hot-Holding	(1)
			Unclean Equipment	(1)
			Improper Cooling	(1)
			Other	(1)
Dairy	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Infected Worker	<i>Salmonella</i>	(2)	Infected Person	(3)
	<i>Shigella</i>	(1)		
No Specific Ingredient	<i>Clostridium perfringens</i>	(2)	Inadequate Refrigeration	(3)
	Gastrointestinal Virus (GI)	(2)	Inadequate Hot-Holding	(4)
	MSG	(1)	Inadequate Cooking	(2)
	<i>Salmonella</i>	(2)	Inadequate Reheating	(1)
	<i>Staphylococcus aureus</i>	(5)	Unclean Equipment	(1)
	Other Chemical	(2)	Added Poisonous Chemicals	(1)
	Unknown	(22)	Improper Cooling	(1)
			Unknown	(28)

2) ROASTED MEAT/POULTRY

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Beef	<i>Clostridium perfringens</i>	(15)	Inadequate Refrigeration (4)
	Gastrointestinal Virus (GI)	(4)	inadequate Hot-Holding (11)
	<i>Salmonella</i>	(3)	Food Prep Several Hrs Before Serving (7)
	<i>Staphylococcus aureus</i>	(1)	Inadequate Cooking (5)
	Unknown	(12)	Inadequate Reheating (9)
			Cross-Contamination (2)
			Unclean Equipment (2)
			Improper Cooling (5)
Pork			Unknown (13)
	<i>Campylobacter</i>	(1)	Inadequate Refrigeration (2)
	<i>Clostridium perfringens</i>	(3)	Inadequate Hot-Holding (3)
	<i>Salmonella</i>	(2)	Food Prep Several Hrs Before Serving (1)
	<i>Staphylococcus aureus</i>	(3)	Inadequate Cooking (4)
	<i>Trichinella spiralis</i>	(2)	Inadequate Reheating (2)
	Unknown	(2)	Contaminated Ingredients (1)
			Infected Person (1)
			Cross-Contamination (2)
			Unclean Equipment (1)
			Improper Cooling (5)
			Hand Contact W/ Implicated Food (1)
			Unknown (1)
Poultry	<i>Bacillus cereus</i>	(1)	Inadequate Refrigeration (8)
	<i>Bacillus subtilis</i>	(1)	Inadequate Hot-Holding (7)
	<i>Campylobacter</i>	(4)	Food Prep Several Hrs Before Serving (7)
	<i>Clostridium perfringens</i>	(7)	Inadequate Cooking (14)
	<i>Salmonella</i>	(18)	Inadequate Reheating (5)
	<i>Staphylococcus aureus</i>	(1)	Contaminated Ingredients (2)
	Unknown	(5)	Infected Person (1)
			Cross-Contamination (2)
			Unclean Equipment (1)
			Improper Cooling (9)
			Hand Contact W/ Implicated Food (2)
			Unknown (10)

Infected Worker	<i>Salmonella</i>	(1)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Infected Person	(1)
			Cross-Contamination	(1)

3) SOLID MASSES OF POTENTIALLY HAZARDOUS FOODS

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS	
Eggs	Salmonella	(20)	Inadequate Refrigeration	(15)
			Inadequate Hot-Holding	(3)
			Food Prep Several Hrs Before Serving	(1)
			Inadequate Cooking	(20)
			Inadequate Reheating	(6)
			Contaminated Ingredients	(14)
			Cross-Contamination	(2)
			Unclean Equipment	(2)
			Improper Cooling	(5)
			Hand Contact w/ Implicated Food	(1)
Beef	Fecal Streptococcus	(1)	Inadequate Refrigeration	(5)
	Bacillus cereus	(1)	Inadequate Hot-Holding	(7)
	Clostridium perfringens	(14)	Food Prep Several Hrs. Before Serving	(1)
	Salmonella	(2)	Inadequate Cooking	(2)
	Unknown	(2)	Inadequate Reheating	(7)
			Infected Person	(1)
			Cross Contamination	(1)
			Unclean Equipment	(3)
			Improper Cooling	(10)
			Hand Contact W/ Implicated Food	(2)
			Unknown	(2)
	Pork	Bacillus cereus	(1)	Unapproved Source
Trichinella spiralis		(1)	Contaminated Ingredients	(1)
			Consumption: Raw/Ltly Htd (Animal Ori)	(1)
			Unknown	(1)
Poultry	Clostridium perfringens	(6)	Inadequate Refrigeration	(3)
	Salmonella	(3)	Inadequate Hot-Holding	(2)
	Shigella	(1)	Food Prep Several Hrs Before Serving	(4)
	Unknown	(1)	Inadequate Cooking	(1)
			Inadequate Reheating	(4)
			Contaminated Ingredients	(1)
			Infected Person	(1)
			Cross-Contamination	(1)
			Improper Cooling	(5)
			Unknown	(2)
Other Seafood	Salmonella	(1)	Inadequate Refrigeration	(1)
	Other Chemical	(1)	Cross-Contamination	(1)
			Hand Contact W/ Implicated Food	(1)
			Unknown	(1)
Starchy Foods	Bacillus cereus	(34)	Inadequate Refrigeration	(9)
	Campylobacter	(1)	Inadequate Hot-Holding	(19)
	Clostridium perfringens	(1)	Food Prep Several Hrs Before Serving	(6)
	Staphylococcus aureus	(1)	Inadequate Reheating	(1)
	Unknown	(8)	Cross-Contamination	(1)
			Unclean Equipment	(2)
			Improper Cooling	(11)
			Unknown	(11)
Other Vegetables	Clostridium perfringens	(2)	Inadequate Refrigeration	(3)
	Staphylococcus aureus	(1)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Food Prep Several Hrs Before Serving	(2)
			Inadequate Cooking	(1)

			Inadequate Reheating	(2)
			Cross-Contamination	(1)
Infected Worker	Gastrointestinal Virus (GI)	(1)	Inadequate Refrigeration	(1)
	<i>Salmonella</i>	(2)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Inadequate Cooking	(1)
	Rotavirus	(1)	Infected Person	(5)
No Specific Ingredient	<i>Bacillus cereus</i>	(6)	Inadequate Refrigeration	(10)
	<i>Clostridium perfringens</i>	(15)	Inadequate Hot-Holding	(23)
	Gastrointestinal Virus (GI)	(4)	Food Prep Several Hrs Before Serving	(9)
	Hepatitis A	(1)	Inadequate Cooking	(5)
	MSG	(1)	Inadequate Reheating	(10)
	<i>Salmonella</i>	(9)	Unapproved Source	(1)
	<i>Shigella</i>	(1)	Infected Person	(3)
	<i>Staphylococcus aureus</i>	(7)	Cross-Contamination	(5)
	Unknown	(35)	Unclean Equipment	(3)
			Improper Cooling	(9)
			Hand Contact w/ Implicated Food	(4)
			Unknown	(41)

4) LIQUID/SEMI-SOLID MIXTURES POTENTIALLY HAZARDOUS FOODS

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(4)	Inadequate Refrigeration
			Inadequate Hot-Holding
			Inadequate Cooking
			Contaminated Ingredients
			Consumption: Raw/Ltly Htd (Animal Ori)
Beef	<i>Clostridium perfringens</i>	(5)	Inadequate Refrigeration
	<i>Salmonella</i>	(1)	Inadequate Hot-Holding
	<i>Staphylococcus aureus</i>	(2)	Food Prep Several Hrs Before Serving
	Unknown	(1)	Inadequate Cooking
			Inadequate Reheating
			Cross-Contamination
			Unclean Equipment
			Improper Cooling
Poultry	<i>Campylobacter</i>	(1)	Inadequate Refrigeration
	<i>Clostridium perfringens</i>	(7)	Inadequate Hot-Holding
	<i>Salmonella</i>	(4)	Food Prep Several Hrs Before Serving
			Inadequate Cooking
			Inadequate Reheating
			Cross-Contamination
			Improper Cooling
			Unknown
Other Seafood	<i>Bacillus cereus</i>	(1)	Inadequate Hot-Holding
	<i>Clostridium perfringens</i>	(1)	Inadequate Cooking
	Unknown	(1)	Inadequate Reheating
			Improper Cooling
Dairy	<i>Staphylococcus aureus</i>	(1)	Inadequate Hot-Holding
			Infected Person
			Hand Contact w/ Implicated Food
Other Vegetables	<i>Clostridium botulinum</i>	(2)	Inadequate Refrigeration
	<i>Clostridium perfringens</i>	(1)	Anaerobic Packaging
			Inadequate Cooking
			Inadequate Reheating
			Improper Cooling

Other Vehicle	<i>Clostridium perfringens</i>	(1)	Inadequate Hot-Holding	(1)
	<i>Salmonella</i>	(1)	Food Prep Several Hrs Before Serving	(1)
			Inadequate Cooking	(1)
			Inadequate Reheating	(2)
Infected Worker	Gastrointestinal Virus (GI)	(1)	Infected Person	(2)
	Norwalk	(1)		
No Specific Ingredient	Fecal Streptococcus	(1)	Inadequate Refrigeration	(4)
	<i>Bacillus cereus</i>	(1)	Inadequate Hot-Holding	(9)
	<i>Campylobacter</i>	(1)	Food Prep Several Hrs Before Serving	(8)
	<i>Clostridium perfringens</i>	(10)	Inadequate Cooking	(1)
	<i>Salmonella</i>	(2)	Inadequate Reheating	(5)
	<i>Staphylococcus aureus</i>	(2)	Infected Person	(1)
	Unknown	(15)	Cross-Contamination	(3)
			Unclean Equipment	(1)
			Improper Cooling	(12)
			Unknown	(11)

5) SALADS PREPARED WITH ONE OR MORE COOKED INGREDIENTS

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS	
Eggs	Salmonella	(4)	Inadequate Refrigeration	(4)
	Unknown	(1)	Food Prep Several Hrs Before Serving	(1)
			Inadequate Cooking	(2)
			Contaminated Ingredients	(3)
			Cross-Contamination	(1)
			Unclean Equipment	(1)
			Improper Cooling	(1)
			Unknown	(1)
Poultry	Clostridium perfringens	(1)	Inadequate Refrigeration	(5)
	Gastrointestinal Virus (GI)	(1)	Inadequate Hot-Holding	(1)
	Salmonella	(4)	Food Prep Several Hrs Before Serving	(2)
	Staphylococcus aureus	(3)	Inadequate Cooking	(1)
	Unknown	(2)	Cross-Contamination	(4)
			Unclean Equipment	(1)
			Improper Cooling	(1)
			Unknown	(3)
Fin Fish	Campylobacter	(1)	Unknown	(1)
Other Seafood	Unknown	(3)	Infected Person	(1)
	Vibrio cholera	(1)	Unknown	(3)
Dairy	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Green Leafy Vegetables	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Infected Worker	Gastrointestinal Virus (GI)	(2)	Inadequate Refrigeration	(3)
	Salmonella	(3)	Infected Person	(7)
	Shigella	(1)	Cross-Contamination	(1)
	Unknown	(1)	Improper Cooling	(2)
			Hand Contact w/ Implicated Food	(3)
No Specific Ingredient	Escherichia coli O157:H7	(1)	Inadequate Refrigeration	(8)
	Bacillus cereus	(1)	Inadequate Hot-Holding	(3)
	Clostridium perfringens	(1)	Food Prep Several Hrs Before Serving	(5)
	Gastrointestinal Virus (GI)	(8)	Inadequate Reheating	(1)
	Salmonella	(10)	Infected Person	(3)

<i>Shigella</i>	(1)	Cross-Contamination	(7)
<i>Staphylococcus aureus</i>	(8)	Unclean Equipment	(6)
Unknown	(15)	Added Poisonous Chemicals	(2)
		Improper Cooling	(2)
		Hand Contact w/ Implicated Food	(3)
		Unknown	(23)
		Other	(1)

6) SALADS WITH RAW INGREDIENTS

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(1)	Inadequate Refrigeration (1) Contaminated Ingredients (1) Consumption: Raw/Ltly Htd (Animal Ori) (1)
Fruits	Gastrointestinal Virus (GI)	(3)	Unknown (3)
Green Leafy Vegetable	Gastrointestinal Virus (GI) Unknown Rotavirus	(7) (3) (1)	Infected Person (2) Cross-Contamination (1) Hand Contact w/ Implicated Food (4) Unknown (6) Other (1)
Other Vegetables	Gastrointestinal Virus (GI) Unknown	(1) (1)	Unknown (2)
Other Vehicle	Gastrointestinal Virus (GI)	(1)	Infected Person (1)
Infected Worker	Gastrointestinal Virus (GI) Hepatitis A Unknown Norwalk	(8) (1) (1) (2)	Infected Person (12) Cross-Contamination (1) Hand Contact W/ Implicated Food (5)
No Specific Ingredient	Gastrointestinal Virus (GI) <i>Salmonella</i> Unknown	(4) (1) (7)	Infected Person (1) Cross-Contamination (1) Improper Cooling (1) Hand Contact W/ Implicated Food (1) Unknown (10)

7) SANDWICHES

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(2)	Inadequate Refrigeration (2) Contaminated Ingredients (2) Cross-Contamination (2) Unclean Equipment (2)
Beef	<i>Escherichia coli</i> O157:H7 <i>Staphylococcus aureus</i>	(1) (1)	Inadequate Cooking (1) Infected Person (1)
Pork	<i>Staphylococcus aureus</i>	(1)	Inadequate Refrigeration (1) Food Prep Several Hrs Before Serving (1)
Poultry	Gastrointestinal Virus (GI) <i>Staphylococcus aureus</i> Unknown	(1) (1) (2)	Inadequate Refrigeration (2) Food Prep Several Hrs Before Serving (1) Infected Person (1)

			Hand Contact w/ Implicated Food (1)
			Unknown (1)
			Other (1)
Green Leafy Vegetables	Gastrointestinal Virus (GI) (1) <i>Salmonella</i> (1)		Cross-Contamination (1) Unknown (1)
Other Vehicle	<i>Staphylococcus aureus</i> (1)		Inadequate Refrigeration (1)
Infected Worker	Gastrointestinal Virus (GI) (5) Hepatitis A (1) <i>Salmonella</i> (1) <i>Staphylococcus aureus</i> (1)		Inadequate Refrigeration (2) Food Prep Several Hrs Before Serving (1) Infected Person (6) Cross-Contamination (2) Hand Contact W/ Infected Food (2)
No Specific Ingredient	<i>E. coli</i> - No Verotoxin: ? type (1) Gastrointestinal Virus (GI) (5) Hepatitis A (1) <i>Salmonella</i> (4) <i>Shigella</i> (2) <i>Staphylococcus aureus</i> (2) Unknown (6)		Inadequate Refrigeration (2) Food Prep Several Hrs Before Serving (1) Infected Person (5) Cross-Contamination (1) Unclean Equipment (1) Improper Cooling (1) Hand Contact w/ Implicated Food (5) Unknown (11)
Unknown	Gastrointestinal Virus (GI) (1)		Unknown (1)

8) BAKED GOODS

SIGNIFICANT INGREDIENTS	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(12)	Inadequate Refrigeration (12) Inadequate Cooking (10) Contaminated Ingredients (12) Cross-Contamination (2) Consumption: Raw/Ltly Htd (Animal Ori) (2)
Dairy	<i>Bacillus cereus</i> (1) Unknown (1)		Unknown (2)
Other Vehicle	Other Chemical	(1)	Added Poisonous Chemicals (1)
Infected Worker	Gastrointestinal Virus (GI) (1) Hepatitis A (1) Unknown (1) Rotavirus (1) Norwalk (1)		Infected Person (4) Hand Contact W/ Implicated Food (2) Unknown (1)
No Specific Ingredient(s)	<i>Bacillus cereus</i> (1) Gastrointestinal Virus (GI) (4) Hepatitis A (1) <i>Salmonella</i> (7) <i>Staphylococcus aureus</i> (5) <i>Giardia lamblia</i> (1) Other Chemical (5) Unknown (13)		Inadequate Refrigeration (7) Food Prep Several Hrs Before Serving (1) Inadequate Cooking (2) Contaminated Ingredients (2) Infected Person (2) Cross-Contamination (2) Added Poisonous Chemicals (2) Improper Cooling (1) Unknown (22)

9) FOODS EATEN RAW OR LIGHTLY COOKED

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(4)	<div>Inadequate Refrigeration (3)</div> <div>Inadequate Cooking (2)</div> <div>Contaminated Ingredients (3)</div> <div>Cross-Contamination (1)</div> <div>Consumption: Raw/Ltly Htd (Animal Ori) (2)</div>
Beef	<i>Trichinella spiralis</i>	(1)	<div>Unclean Equipment (1)</div> <div>Consumption: Raw/Ltly Htd (Animal Ori) (1)</div> <div>Other (1)</div>
Pork	<i>Trichinella spiralis</i>	(2)	<div>Contaminated Ingredients (2)</div> <div>Consumption: Raw/Ltly Htd (Animal Ori) (2)</div>
Fin Fish	<div><i>Clostridium botulinum</i> (1)</div> <div><i>Salmonella</i> (1)</div> <div>Other Chemical (1)</div> <div>Unknown (2)</div>		<div>Inadequate Refrigeration (1)</div> <div>Food Prep Several Hrs Before Serving (1)</div> <div>Improper Cooling (1)</div> <div>Consumption: Raw/Ltly Htd (Animal Ori) (2)</div> <div>Unknown (2)</div> <div>Other (1)</div>
Shellfish	<div>Gastrointestinal Virus (GI) (127)</div> <div>Hepatitis A (5)</div> <div>Unknown (11)</div> <div>Norwalk (63)</div> <div><i>Vibrio parahaemolyticus</i> (1)</div> <div>Snow Mountain Agent (4)</div> <div><i>Vibrio vulnificus</i> (4)</div> <div>Other Chemical (1)</div>		<div>Inadequate Cooking (1)</div> <div>Unapproved Source (198)</div> <div>Contaminated Ingredients (200)</div> <div>Cross-Contamination (1)</div> <div>Consumption: Raw/Ltly Htd (Animal Ori) (202)</div> <div>Unknown (11)</div>
Other Seafood	Unknown	(1)	Unknown (1)
Dairy	Staphylococcus Aureus	(1)	<div>Inadequate Refrigeration (1)</div> <div>Unapproved Source (1)</div> <div>Consumption: Raw/Ltly Heated (Animal Ori) (1)</div>
No Specific Ingredient	Gastrointestinal Virus (GI)	(1)	Unknown (1)

10) COMMERCIALY PROCESSED FOODS

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(1)	Inadequate Cooking (1)
Beef	<div>Gastrointestinal Virus (GI) (1)</div> <div><i>Salmonella</i> (5)</div> <div><i>Staphylococcus aureus</i> (1)</div> <div>Unknown (1)</div>		<div>Inadequate Hot-Holding (1)</div> <div>Inadequate Cooking (3)</div> <div>Contaminated Ingredients (2)</div> <div>Infected Person (1)</div> <div>Unknown (1)</div>
Pork	Unknown	(1)	Unknown (1)
Beverage	<div>Other Chemical (1)</div> <div>Unknown (1)</div>		<div>Added Poisonous Chemicals (1)</div> <div>Unknown (1)</div>

Poultry	Gastrointestinal Virus (GI)	(2)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Unknown	(2)
Fin Fish	<i>Clostridium botulinum</i>	(1)	Inadequate Refrigeration	(1)
	<i>Staphylococcus aureus</i>	(1)	Inadequate Hot-Holding	(1)
	Other Chemical	(1)	Anerobic Packaging	(1)
	Unknown	(1)	Inadequate Cooking	(1)
			Contaminated Ingredients	(1)
			Improper Cooling	(1)
			Other	(2)
Starchy Foods	<i>Salmonella</i>	(1)	Natural Toxicant	(1)
	Unknown	(1)	Unknown	(1)
Dairy	Gastrointestinal Virus (GI)	(2)	Inadequate Cooking	(1)
	<i>Salmonella</i>	(1)	Unknown	(3)
	<i>Staphylococcus aureus</i>	(1)		
Other Vegetables	<i>Clostridium botulium</i> (1)		Inadequate Refrigeration	(1)
			Contaminated Ingredients	(1)
Mushrooms	<i>Staphylococcus aureus</i>	(1)	Contaminated Ingredients	(1)
Other Vehicle	<i>Clostridium botulinum</i>	(1)	Contaminated Ingredients	(1)
	Other Chemical	(3)	Unknown	(3)
Infected Worker	<i>Staphylococcus aureus</i>		Unapproved Source	(2)
			Contaminated Ingredients	(2)
No Specific Ingredients	<i>Beta Hemolytic Streptococcus</i>	(1)	Inadequate Refrigeration	(1)
	<i>Salmonella</i>	(1)	Hand Contact w/ Implicated Food	(1)
	<i>Staphylococcus aureus</i>	(1)	Unknown	(4)
	Unknown	(3)		

11) NATURAL TOXICANT

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS	
Beverage	Other Chemical	(1)	Contaminated Ingredients	(1)
			Natural Toxicant	(1)
Fin Fish	Ciguatera Toxin	(1)	Inadequate Refrigeration	(2)
	Scombrototoxin	(95)	Natural Toxicant	(3)
			Unknown	(92)
Shellfish	Other Chemical	(1)	Unknown	(1)
Other Seafood	Other Chemical	(1)	Natural Toxicant	(1)
Diary	Scombrototoxin	(1)	Unknown	(1)
Other Vegetables	Other Chemical	(1)	Inadequate Cooking	(1)
			Natural Toxicant	(1)
Mushrooms	Mushrooms	(15)	Unapproved Source	(5)
			Natural Toxicant	(8)
			Unknown	(2)
			Other	(1)

12) MULTIPLE FOODS

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(5)	Inadequate Refrigeration (4) Inadequate Cooking (4) Contaminated Ingredients (2) Cross-Contamination (4) Unclean Equipment (2) Improper Cooling (1)
Beef	Gastrointestinal Virus (GI)	(1)	Other (1)
Poultry	<i>Salmonella</i>	(1)	Inadequate Refrigeration (1) Inadequate Cooking (1) Inadequate Reheating (1)
Fin Fish	Scombrototoxin	(1)	Unknown (1)
Shellfish	Unknown Norwalk	(2) (2)	Inadequate Refrigeration (1) Inadequate Cooking (1) Unapproved Source (3) Contaminated Ingredients (2) Unclean Equipment (1) Consumption: Raw/Ltly Htd (Animal Ori) (2) Unknown (1) Other (1)
Other Vehicle	Hepatitis A Unknown	(1) (1)	Infected Person (1) Other (1)
Infected Worker	<i>Campylobacter</i> Gastrointestinal Virus (GI) Hepatitis A <i>Salmonella</i> <i>Staphylococcus aureus</i> <i>Shigella</i> Unknown	(1) (13) (2) (6) (1) (1) (1)	Food Prep Several Hrs Before Serving (1) Infected Person (23) Cross-Contamination (2) Hand Contact w/ Implicated Food (5) Unknown (2)
No Specific Ingredients	<i>Bacillus cereus</i> Pesticide <i>Campylobacter</i> <i>Clostridium perfringens</i> Gastrointestinal Virus (GI) Hepatitis A Heavy Metal MSG <i>Salmonella</i> <i>Shigella</i> <i>Staphylococcus aureus</i> Unknown Rotavirus <i>Yersinia enterocolitica</i> (1)	(4) (1) (1) (3) (25) (1) (1) (1) (1) (16) (1) (6) (61) (5)	Inadequate Refrigeration (9) Inadequate Hot-Holding (16) Food Prep Several Hrs Before Serving (6) Inadequate Cooking (7) Inadequate Reheating (7) Unapproved Source (1) Infected Person (21) Cross-Contamination (7) Unclean Equipment (3) Added Poisonous Chemicals (2) Improper Cooling (3) Hand Contact W/ Implicated Food (11) Consumption: Raw/Ltly Htd (Animal Ori) (2) Unknown (69) Other (2)
Unknown	Hepatitis A	(1)	Infected Person (1)

13) BEVERAGES

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(3)	Inadequate Refrigeration (1) Contaminated Ingredients (3) Consumption: Raw/Ltly Htd (Animal Ori) (3)
Beverage	Pesticide (1) Gastrointestinal Virus (GI) (4) Heavy Metal (1) Other Chemical (3) Unknown (2)		Unapproved Source (2) Contaminated Ingredients (2) Infected Person (1) Added Poisonous Chemicals (3) Hand Contact w/ Implicated Food (1) Unknown (2) Other (2)
Dairy	<i>Campylobacter</i> (3) Gastrointestinal Virus (GI) (2) <i>Salmonella</i> (1) Unknown (3)		Unapproved Source (4) Contaminated Ingredients (1) Hand Contact w/ Implicated Food (1) Consumption: Raw/Ltly Htd (Animal Ori) (3) Unknown (4)
Infected Worker	Gastrointestinal Virus (GI) (3) <i>Salmonella</i> (1) Unknown (3)		Infected Person (6) Improper Cooling (1) Hand Contact w/ Implicated Food (2) Unknown (1)
No Specific Ingredient	Pesticide (1) Other Chemical (1) Unknown (1)		Unknown (3)
Unknown	<i>Salmonella</i>	(1)	Unknown (1)

14) UNKNOWN

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(1)	Unknown (1)
Beef	<i>Salmonella</i>	(1)	Inadequate Hot-Holding (1) Food Prep Several Hrs Before Serving (1) Inadequate Cooking (1) Unapproved Source (1)
Poultry	Gastrointestinal Virus (GI) (1) Unknown (4)		Unknown (5)
No Specific Ingredient	<i>Clostridium perfringens</i> (1) Gastrointestinal Virus (GI) (1) Unknown (3)		Infected Person (1) Unclean Equipment (1) Hand Contact w/ Implicated Food (1) Unknown (3)
Unknown	<i>Beta Hemolytic Streptococcus</i> (3) <i>Escherichia coli</i> O157:H7 (3) <i>Bacillus cereus</i> (5) <i>Clostridium botulinum</i> (2) <i>Campylobacter</i> (14) <i>Clostridium perfringens</i> (13) Gastrointestinal Virus (GI) (89) Hepatitis A (7) MSG (1) <i>Pseudomonas aeruginosa</i> (1) <i>Salmonella</i> (85)		Inadequate Refrigeration (15) Inadequate Hot-Holding (14) Food Prep Several Hrs Before Serving (4) Inadequate Cooking (8) Inadequate Reheating (5) Infected Person (52) Cross-Contamination (9) Unclean Equipment (13) Added Poisonous Chemicals (2) Improper Cooling (5) Hand Contact w/ Implicated Food (5)

<i>Shigella</i>	(5)	Unknown	(445)
<i>Staphylococcus aureus</i>	(4)	Other	(4)
<i>Giardia lamblia</i>	(2)		
Other Chemical	(4)		
Parasite	(1)		
Unknown	(283)		
Rotavirus	(5)		
Norwalk	(9)		

15) CHEMICAL CONTAMINATION

SIGNIFICANT INGREDIENT	AGENTS	OUTBREAKS	CONTRIBUTING FACOTRS
Beef	Other Chemical	(1)	Added Poisonous Chemicals (1)
Beverage	Heavy Metal Other Chemical	(10) (8)	Toxic Container (4) Added Poisonous Chemicals (7) Unknown (6) Other (3)
Other Seafood	Other Chemical	(1)	Unknown (1)
Starchy Foods	Pesticide MSG Other Chemical	(1) (1) (4)	Added Poisonous Chemicals (2) Unknown (3) Other (1)
Dairy	Pesticide Other Chemical	(1) (4)	Toxic Container (1) Added Poisonous Chemicals (1) Unknown (3)
Green Leafy Vegetable	Other Chemical	(3)	Added Poisonous Chemicals (1) Unknown (2)
Other Vegetables	Pesticide	(1)	Natural Toxicant (1)
Other Vehicle	Heavy Metal Other Chemical	(1) (1)	Toxic Container (1) Added Poisonous Chemicals (1)
No Specific Ingredients	MSG Other Chemical	(1) (18)	Added Poisonous Chemicals (12) Unknown (6) Other (1)

16) OTHER

SIGNIFICANT INGREDIENT	AGNETS	OUTBREAKS	CONTRIBUTING FACTORS
Eggs	<i>Salmonella</i>	(1)	Inadequate Refrigeration (1) Inadequate Cooking (1) Contaminated Ingredients (1) Cross-Contamination (1)
Dairy	Gastrointestinal Virus (GI)	(1)	Unknown (1)

Other Vegetables	<i>Clostridium botulinum</i>	(1)	Food Prep Several Hrs Before Serving	(1)
Other Vehicle	<i>Salmonella</i>	(1)	Inadequate Refrigeration	(1)
Infected Worker	<i>Shigella</i>	(1)	Infected Person	(2)
	Unknown	(1)		
No Specific Ingredient	<i>Campylobacter</i>	(1)	Cross-Contamination	(1)
	Gastrointestinal Virus (GI)	(2)	Unclean Equipment	(1)
			Unknown	(2)

* Each Method of Preparation category is defined on the last page of this appendix.

+ Number of reported outbreaks for specific agent in above category.

Number of outbreaks where specific contributing factor was reported with above category. Any outbreak may report none or more than one contributing factor.

Source: New York State Department of Health, Bureau of Community Sanitation and Food Protection, 11 University Place, Room 404, Albany, New York 12203. July 1997. Used with permission.

Method of Preparation Categories*

Cook/Serve Foods: Preparation steps limited to cook/serve or cook/hot hold/serve; cooking is likely to destroy vegetative microbial pathogens; a potentially hazardous food (as per FDA Food Code) is often an ingredient; the foods are completely cooked within 30 min. and usually served within 1 hour, e.g., fish fillets, lobster, eggs prepared individually, steaks, chops, sausage, chicken pieces and pizza.

Roasted Meat/Poultry: Roasted, baked, etc., solid pieces of meat/poultry and/or formed masses of ground or chipped meat or poultry that are greater than 3 in. thick. Usually cooked longer than 30 min., e.g., roast beef, whole turkey, broiler chickens, baked ham, gyro, stuffed chicken breasts, meat loaf and turkey roll.

Solid Masses of Potentially Hazardous Foods: Food preparation steps sometimes involve combining of several ingredients prior to cooking the food followed by hot-holding and service. This category also includes solid masses of single potentially hazardous foods, such as rice and refried beans, e.g., casseroles, lasagna, baked ziti, meatballs and crabmeat stuffing.

Liquid or Semi-Solid Mixture of Potentially Hazardous Foods: Food preparation steps usually involve combining of several ingredients prior to or during cooking followed by hot holding and service of cooling, reheating, hot-holding and service, e.g., sauce, soup, gravy, chili, stew and chowder.

Salads Prepared with One or More Cooked Ingredients: One or more ingredients are cooked prior to combining with raw ingredients and then served cold. These salads usually include one or more potentially hazardous ingredients, e.g., egg, chicken, turkey, ham, tuna, potato, antipasto, macaroni and pasta salad.

Salads with Raw Ingredients: Ingredients are generally not cooked and are served cold. These salads do not usually contain a potentially hazardous ingredient except possibly the dressing, e.g., green salads, fresh tomatoes, fruit salad, relish tray, cole slaw and raw vegetables.

Sandwiches: Ingredients are assembled and served between two slices of bread or other baked goods and served hot or cold. This category is selected when the investigation determines that the preparation error that led to the outbreak occurred at the time of assembly or serving of the food, e.g., hamburger, hot dog, bacon-lettuce-tomato (BLT), toasted cheese sandwich, club sandwich and Monte Cristo sandwich.

Baked Goods: Baking, cooking, icing or filling and cold and/or hot-holding are preparation steps. Some ingredients may be potentially hazardous e.g., meat-filled pastries, such as calzones, croissants and other pastries, such as cakes, pies, cookies, breads, rolls, icing, non-diary whipped toppings, and eclairs.

Foods Eaten Raw or Lightly Cooked: These are served uncooked or after a heating that would not destroy vegetative pathogens. Preparation steps involve cold storage, cleaning, opening, steaming or other light cooking and service. This category does not include commercially canned foods, e.g., hard-shell clams, oysters, mussels - consumed whole raw or steamed, steak tartar, Caesar salad with raw egg, lightly cooked eggs and hollandaise sauce.

Commercially Processed Foods: A food that has been processed in another facility prior to the locations where it was served e.g., pasteurized milk, precooked roast beef, precooked poultry, surimi (processed and formed fish), canned fruits and vegetables and ice cream.

Natural Toxicant: A toxin of biologic origin that either develops or bioaccumulates in the food prior to final preparation and service, e.g., poisonous mushrooms, shellfish containing toxins capable of causing paralytic shellfish poisoning, neurotoxic shellfish poisoning, diarrhetic shellfish poisoning and amnesic shellfish poisoning, reef fish containing ciguatoxin, scombrototoxin (histamine), mycotoxins and plant toxins.

Multiple Foods: More than one food statistically implicated; does not fit any single category; foods from more than one category implicated, e.g., salad bar, smorgasbord and buffet.

Beverages: Preparation steps include reconstitution, mixing, dispensing and serving. Foods in liquid form served with or without ice. Contamination and/or multiplication occurs at the point of service, e.g., carbonated and non-carbonated beverages, alcohol, milk, ice, juices and hand-dipped ice cream.

Unknown: An implicated vehicle was not identified and contributing factors were not determined.

Chemical Contamination: A substance of non-biologic origin that is introduced at toxic levels during harvest, processing or service, e.g., heavy metals, pesticides, food additives (niacin).

Other: Food implicated, but does not fit any of the above categories.

* Foods are assigned to the category that best describes the step or process where contributing factors that lead to the outbreak occurred.

Source: Weingold, S. et al, Use of Foodborne Disease Data for HACCP Risk Assessment, *Journal of Food Protection*, Vol. 57, Sept., 1994.